

Compliant Gripper for a Robotic Manipulator

Diverse small objects can be manipulated without force-feedback control.

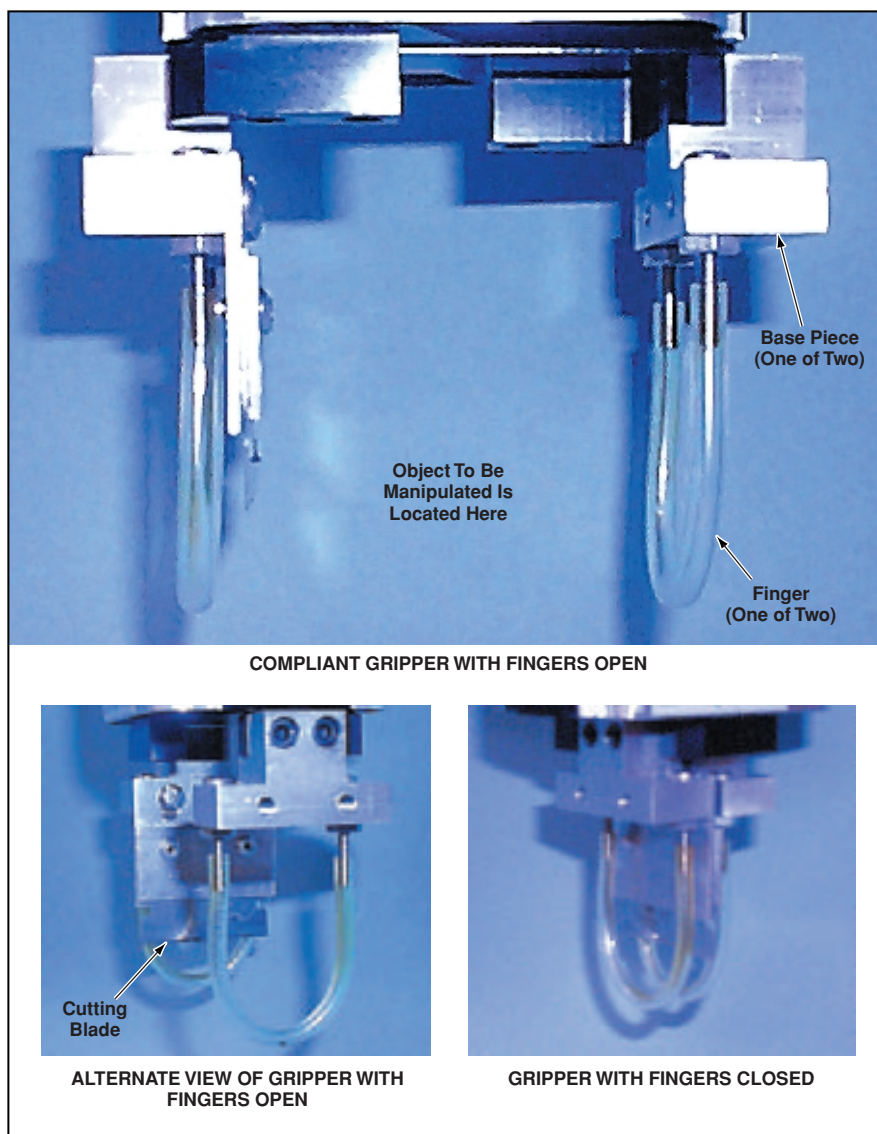
NASA's Jet Propulsion Laboratory,
Pasadena, California

The figure depicts a prototype of a robotic-manipulator gripping device that includes two passive compliant fingers, suitable for picking up and manipulating objects that have irregular shapes and/or that are, themselves, compliant. The main advantage offered by this device over other robotic-manipulator gripping devices is simplicity: Because of the compliance of the fingers, force-feedback control of the fingers is not necessary for gripping objects of a variety of sizes, shapes, textures, and degrees of compliance. Examples of objects that can be manipulated include small stones, articles of clothing, and parts of plants.

The device includes two base pieces that translate relative to each other to effect opening and closing of the compliant gripping fingers. Each finger is made of a piece of elastomeric tubing bent into a U shape and attached at both ends to one of the base pieces. This arrangement of the finger provides compliance, both in orientation and in translation along all three spatial dimensions.

Because the specific application for which this device was designed involves picking up and cutting plant shoots for propagation of the plants, the device includes a cutting blade attached to one of the base pieces. By positioning the device to hold an object, then closing the fingers to grip the object, then driving the base pieces downward toward the object, one can cause the blade to cut the object into two pieces. Because, prior to cutting, the fingers are both holding the object and in contact with the surface on which the object is resting, it is possible to move the base pieces sideways simultaneously to center the blade while keeping the object immobile.

The prototype gripper has been shown to be capable of picking up a small object. There is a need to refine the design of the gripper; in particular, there is a need to incorporate a sensor that would measure the position of an object relative to that of



This **Gripping Device** can manipulate and cut a plant shoot or other small object.

the gripper. Other aspects of the design expected to be refined in continuing development include the general problem of gripping, the method of actuation for closing the fingers, the shape of the fingers, fixturing, and cutting.

This work was done by Raymond

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NPO-21104

Hybrid Aerial/Rover Vehicle

This robotic vehicle would combine features of balloons and "beach-ball" rovers.

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A proposed instrumented robotic vehicle called an "aerover" would fly, roll along the ground, and/or float on bodies of liquid, as

needed. The aerover would combine features of an aerobot (a robotic lighter-than-air balloon) and a wheeled robot of the "rover"

class. An aerover would also look very much like a variant of the "beach-ball" rovers described in "Lightweight 'Beach-